28th TJIMO

Alexandria, Virginia

Round: **Team**

Problem 1. Upon reaching level 19, Kangaskhan can learn the move "Double Hit", which hits twice and deals x damage per hit. However, upon Mega-Evolving into Kangaskhan-Mega, Kangaskhan gains a special ability that allows it to use each move twice, with the second instance of the move dealing half damage. If Kangaskhan-Mega deals 105 damage in total using Double Hit, find x.

Problem 2. In triangle ABC, AB = 12 feet and BC = 10 feet. If the altitude of ABC from side AB is equal to 5 feet, what is the altitude of ABC from side BC in feet?

Problem 3. Cubone is chopping up a cube with side length 3 in. into 27 little cubes with side length 1 in. Find the minimum number of straight cuts this takes, if Cubone can rearrange pieces that have been chopped off in any manner.

Problem 4. Alan, Allen, Allan, Chang, Cheng, and Ch@ng are standing in line to buy tickets for a movie. However, Allen and Cheng insist on standing next to each other. How many ways can the 6 people stand in line?

Problem 5. Ships Jendy and Sam6 are racing down a 500 km waterway. Jendy is going full speed ahead at 30 km/hr, but the captain of Sam6, Mr. Skim, is currently sleeping and has set the ship Sam6 on autopilot at 20 km/hr. When Mr. Skim wakes up, he instantly increases Sam6's speed to 45 km/hr in an effort to catch up. What is the maximum time in hours Mr. Skim can spend sleeping to be able to catch up to Jendy by the end of the race?

Problem 6. Pikachu is facing off against Blissey, who has a high special defense. Luckily, Pikachu knows the move Charge Beam, which has a 70 percent chance of boosting Pikachu's special attack by 1 stage. What is the probability that Pikachu gets at least 2 special attack boosts in 3 moves?

Problem 7. Find the number of factors of 60300 that are divisible by 30.

Problem 8. Kevlin and Kelvin are playing a game where they normally each start out with 1500 points. However, both of them think 1500 is a boring number, so they decide to each start out with a random real number of points from 0 to 2000, determined by a computer randomizer. However, if the difference in points between them is over 1800, they will run the computer randomizer again. What is the probability that they won't have to run the computer randomizer again?

Problem 9. Let $x^2 = 7 + 4\sqrt{3}$ and $y^2 = 7 - 4\sqrt{3}$. There are then four distinct values of $x - y$. What is the minimum value of these four values?

Problem 10. A shuriken-shaped design is made by cutting off four quarter-circles from the corners of a square of side length 8 inches. A circle is then inscribed in the shuriken, as shown below. Find the area of the shuriken outside the circle, in square inches.

Time limit: 30 minutes.

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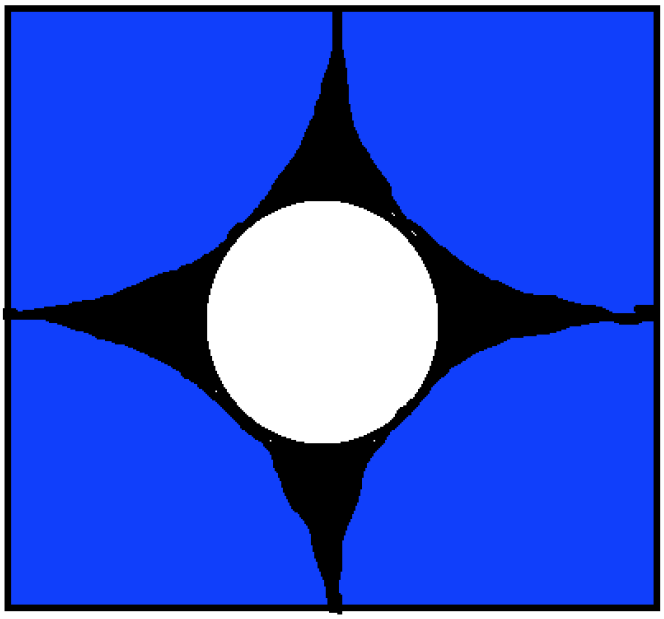

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